Section 7
FCSA Conclusions & Recommendations

7.1 Summary of FCSA Findings

The CSA study of the Old Amherst Landfill was conducted to assess and characterize potential landfill impacts to human health, public safety and the environment and to determine if corrective actions are required to mitigate potential site risks or impacts. Findings from this study include:

7.1.1 Hydrogeologic Characterization

Twelve groundwater monitoring wells and two gas monitoring wells were installed for the FCSA Study at eight locations. Monitoring wells were installed upgradient of the site, directly downgradient of the site at the landfill perimeter and adjacent to downgradient groundwater discharge areas. Groundwater monitoring wells were installed at shallow (water table) and deep locations within the surficial aquifer, confining layer (where present) and confined aquifer (where present), and at two locations into the underlying bedrock.

Underlying soils at the landfill site are characterized as very fine to coarse sands and gravels above bedrock. A confining layer of glaciolacustrine very fine sand, silt and clay is present below grade to the west of the site along the Hop Brook flood plain. The confining layer is underlain by a thin confined aquifer (where present) consisting of fine to coarse sands, underlain by glacial till and/or bedrock. Bedrock is characterized as arkosic sandstone. The confined aquifer is under artesian conditions at the #6-08/#7-08 monitoring well cluster location.

Groundwater flow beneath and downgradient of the site is generally to the west, discharging to the Hop Brook flood plain and associated wetland areas. Groundwater flow velocities beneath and downgradient of the site in the surficial aquifer vary with groundwater gradient and aquifer hydraulic conductivity. Shallow groundwater flow rates in the surficial aquifer at the landfill site vary from about 1 foot per day (ft/day) beneath the northern and central portions of the landfill site to about 3 ft/day beneath the southern portion of the site. Downgradient shallow groundwater flow velocities were estimated at about 0.4 ft/day or 150 feet per year.

Surface water flow in the vicinity of the site is east to west towards the Hop Brook flood plain and associated wetland areas located west of the Old Amherst Landfill site. Hop Brook flows south to north in its flood plain and discharges to the Fort River at a location approximately 1-mile northwest of the landfill. The primary drainage area for Hop Brook is the Lawrence Swamp basin located approximately 1-mile south of the landfill site. This basin is the primary groundwater supply source for the Town of Amherst where a series of high-yield water supply wells were developed in a confined aquifer of permeable sands and gravel. The confined aquifer in the Lawrence Swamp basin underlies thick glaciolacustrine deposits of very fine sands, silts and clays and is under artesian conditions at various locations. The "Zone II" limit for these wells is located south and east of the landfill site.

Wetland areas affected by the discharge of contaminated groundwater were identified in the area of Gull Pond (station SW-1), the KC Trail wetland (stations SW-6 and SW-14)

and the SW-15 wetland located at the intersection of Old Farm Road and Hop Brook Drive. The wetlands, in particular the KC Trail wetland and the inlet to Gull Pond, are visually impacted by the presence of reddish-brown discolored sediments.

7.1.2 Environmental Monitoring & Contaminant Characterization

The FCSA Report is based on two rounds of site-wide environmental monitoring, one round conducted in November 2005 for the Interim CSA Report and one round conducted in October 2008 for the FCSA study. The CSA environmental monitoring program included the collection of groundwater, surface water and sediment samples for the analytical parameters listed in *Massachusetts Solid Waste Regulation 310 CMR 19.132(1)h*. Additional sediment and surface water samples were collected and analyzed for a limited number of analytical parameters as part of the FCSA study. Potential "Contaminants of Concern (COCs)" were identified in each media by comparison to applicable standards or guidelines.

1) **Groundwater:** Potential landfill groundwater quality impacts include moderate elevated (>500 umhos/cm) to elevated (>1,000 umhos/cm) specific conductance, elevated levels (>500 mg/L) of total dissolved solids (TDS) and low <3.0 mg/L) levels of dissolved oxygen. Metals detected in the groundwater included low levels arsenic (As), and elevated levels of the metals iron (Fe) and manganese (Mn). A few volatile organic compounds (VOCs) were detected infrequently in various groundwater samples at trace to low concentrations. While detected, individual compounds were not found to be wide ranging in the surficial, confined or bedrock aquifers or frequently detected at high concentrations.

   Groundwater contaminants of concern (COCs) identified in the FCSA analytical data are the metals arsenic (As) at trace to low concentrations, and iron (Fe) and manganese (Mn) at elevated concentrations. Other metals such as barium (Ba), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg) and zinc (Zn) were either detected at low frequencies and low concentrations, also detected in the groundwater upgradient of the site, or were detected during total metals analysis and not during dissolved metals analysis and are therefore not considered COCs. No VOCs are identified as COCs in the groundwater.

2) **Surface Water:** Potential surface water quality impacts include moderate elevated (200-500 umhos/cm) specific conductance, alkalinity (100-300 mg/L), chemical oxygen demand (COD) above 100 mg/L, moderated elevated TOS (200-500 mg/L), pH less than 6.5 standard units, trace levels of cyanide, low <3.0 mg/L) levels of dissolved oxygen Metals detected in the surface water included trace levels of arsenic (As) and trace to low levels of lead (Pb), and elevated levels of iron (Fe) and manganese (Mn). Very few target VOCs and non-target compounds were detected in the surface water samples at trace concentrations; none were found to be frequently detected.

   The one surface water COC is the metal lead (Pb) at the SW-15 wetland area. Other contaminants such as cyanide which was were detected in one of three samples at the KC Trail wetland area and two of five samples at the SW-15 wetland area was detected low concentrations and low frequencies and therefore was not identified as a COC for surface water at these locations. No VOCs are identified as COCs in the surface water.

3) **Sediments:** Potential landfill sediment quality impacts include cyanide was identified in one of two samples at the KC Trail wetland, the metals arsenic (As), cadmium (Cd), mercury (Hg) and elevated levels of iron (Fe). The elevated metals concentrations in the sediments are the likely result of groundwater discharge to the downgradient wetland areas. Very few target VOCs and non-target compounds were detected in the sediment samples at trace to low concentrations.

   Sediment COCs are arsenic (As) at the Gull Pond inlet station, arsenic (As) and cadmium (Cd) at the KC Trail wetland area, and mercury (Hg) at the SW-15 wetland area. No VOCs are identified as COCs in sediment.

4) **Soil Air:** Potential landfill gas impacts to soil air on-site and adjacent to the site include methane, carbon dioxide and trace levels of hydrogen sulfide gas. These gases are generated in the landfill and may migrate off-site in the subsurface through unsaturated soils and potentially impact abutting properties and subsurface utilities such as drainage lines and catch basins. A low oxygen level is also identified as a potential landfill gas impact to soil air.

7.1.3 Baseline Risk Assessment

The qualitative risk assessment for the Old Amherst Landfill site identified five potential exposure pathways for human health, public safety and environmental impact:

1) **Groundwater:** Groundwater exposure pathways are limited to downgradient groundwater discharge areas for the aquifer underlying the site. These exposure pathways include contaminant transport and discharge to downgradient wetlands and surface waters. Direct exposure to contaminated groundwater in the surficial, confined, or bedrock aquifer was not identified as a significant exposure pathway.

2) **Surface Water:** Environmental monitoring of surface waters in streams, ponds and wetlands downgradient and adjacent to the site indicate that there are few significant water quality impacts to surface water that could be attributed to the landfill site at concentrations less than drinking water standards or guidelines.

3) **Sediment:** Analytical results from sediment samples collected from the KC Trail wetland (As and Cd) located between Hop Brook Drive and Old Farm Road, from the inlet of Gull Pond (As) and from the SW-15 wetland area (Hg) indicate that a potential human exposure pathway to impacted sediments exists. Based on the sediment data, the MassDEP required that a "Focused Risk Characterization" be conducted for the KC Trail wetland and the Gull Pond inlet locations.

   KC Trail Wetland: Results of the focused quantitative risk assessment indicate that a condition of No Significant Risk to human health exists for fall victims and neighborhood children who engage in recreational or trespassing activities within the KC Trail wetland area located between Hop Brook Drive and Old Farm Road.

   Gull Pond Inlet: Results of the focused quantitative risk assessment indicate that a condition of No Significant Risk to human health exists for fall victims and neighborhood children who engage in recreational activities or trespassing at the Gull Pond inlet.

   SW-15 Wetland Area: A focused quantitative risk assessment was not conducted for the SW-15 wetland area. However, this wetland area is a forested wetland that

is not readily accessible to the general public and therefore was not considered a significant human health or public safely exposure risk. No additional assessment or evaluation is recommended for this wetland area.

4) **Environmental Risk:** Sediment the KC Trail wetland (for arsenic (As) and cadmium (Cd)), the inlet of Gull Pond (for arsenic (As)) and the SW-15 wetland area (for mercury (Hg)) are considered contaminant exposure pathways for environmental receptors, specifically for local terrestrial and aquatic biota:

   KC Trail Wetland: Arsenic (As) and cadmium (Cd) were detected at concentrations exceeding the MassDEP Screening Criteria of 33 mg/kg and 5.0 mg/kg, respectively. Concentrations were highest in the central portion of the wetland and less than MassDEP threshold levels along the edges of the wetland. Iron (Fe) levels exceeded Ontario Guidelines for "Severe Effect Levels" (SELs) for iron (Fe) of 40,000 mg/kg in four of four samples. The Ontario SEL is defined as the concentration that would be detrimental to the majority of benthic species.

   Gull Pond Inlet: Arsenic (As) was detected at concentrations exceeding the MassDEP Screening Criteria of 33 mg/kg in four of six samples. Iron (Fe) concentrations in two of two samples exceeded the Ontario Guideline SEL for iron (Fe) of 40,000 mg/kg.

   SW-15 Wetland Area: Mercury (Hg) was detected in four of four samples at concentrations exceeding MassDEP Screening Criteria of 0.18 mg/kg.

5) **Landfill Gases:** Off-site subsurface migration of landfill gases in the soil air represents a human health and public safety risk. Although methane or other landfill gases were not detected at levels exceeding regulatory threshold concentrations during soil gas monitoring conducted for the Interim CSA study and FCSA study, landfill gases generated through the decomposition of wastes represents a diminishing human health and public safety risk into the future as waste decomposition slows over time and the landfill gas generation decreases.

7.2 FCSA Recommendations

The following recommendations are provided based on the results of the Interim CSA and Final CSA studies:

1) **Additional Assessment Activities:** The environmental monitoring data collected and evaluated for the CSA Report is adequate to characterize environmental impacts from the Old Amherst Landfill. No further assessment activities are warranted.

   No additional assessment work is warranted at the site and a Corrective Action Alternatives Analysis (CAAA) is not recommended based on the data evaluated for the CSA study. The site was closed in the early 1980s using a 2-foot soil final cover system and has been adequately maintained by the Town of Amherst.

2) **Post-CSA Environmental Monitoring Program:** A post-CSA environmental monitoring program is recommended for the Old Amherst Landfill site as required under *Massachusetts Solid Waste Regulations 310 CMR 19.142(5)*.

The landfill has been inactive since the early 1980s when waste disposal ceased on-site and site was closed and covered with a 2-foot soil final cover system. Environmental monitoring data collected at the site indicates a stabilized condition relative to contaminant concentrations in downgradient groundwater. Based on this data, a annual post-closure monitoring program is recommended that focuses on monitoring downgradient water quality in the surficial and confined aquifers.

a) **Groundwater Monitoring:** The proposed groundwater monitoring program is focused on evaluating potential landfill contaminant impacts to the surficial and confined aquifers downgradient of the site and includes the following monitoring wells:

#01-08	**Surficial Aquifer - Upgradient Monitoring Well**
#6-08	**Confined Aquifer - Downgradient Monitoring Well**
#8-08	**Surficial Aquifer - Downgradient Monitoring Well**
#9-08	**Confined Aquifer - Downgradient Monitoring Well**
#10-08	**Confined Aquifer - Downgradient Monitoring Well**
#11-08	**Surficial Aquifer - Downgradient Monitoring Well**
#1-03	**Surficial Aquifer – Cross-gradient Monitoring Well**
#12-08	**Confining Layer - Cross-gradient Monitoring Well**

Recommended monitoring parameters are those required under Massachusetts Solid Waste Regulations 310 CMR 19.132(1)h. Metals analysis should be by dissolved metals to limit the effect of turbidity and suspended sediments on the analyses.

b) **Surface Water Monitoring:** The proposed surface water-monitoring program is focused on monitoring potential landfill contaminant impacts to the downgradient surface waters as follows:

SW-1	**Gull Pond Inlet**
SW-2	**Gull Pond**
SW-6	**KC Trail Wetland Area**
SW-15	**SW-15 Wetland Area**

Monitoring parameters are those listed under Massachusetts Solid Waste Regulations 310 CMR 19.132(1)h. Analysis for "dissolved" metal concentrations is recommended.

c) **Perimeter Soil Gas Monitoring:** Semi-annual monitoring of gas monitoring wells for the parameters listed under Massachusetts Solid Waste Regulations 310 CMR 19.132(4) including percent combustible gas, percent oxygen and hydrogen sulfide gas at the parts per million (ppm) level.

3) **Surface Cover Improvements**: Field observations of the surface cover at the Old Amherst Landfill indicate that the Town has adequately maintained the site since closure in accordance with *Massachusetts Solid Waste Regulations 310 CMR 19.000*. However, differential settlement of the landfill surface since site closure in the early 1980s has resulted in scattered areas of poor surface drainage that result in the ponding of runoff on capped areas of the site. Based on these observations, Tighe & Bond recommends the following maintenance actions be undertaken:

a) **Landfill Surface Maintenance:** Undertake a maintenance program to re-establish 2 percent minimum landfill surface slopes to the perimeter of the site or to storm water drainage swales and retention areas by the placement of additional soil or alternative soil materials. Areas of surface ponding should be filled and eliminated. Areas disturbed by the placement of soils should be provided with a 6-inch minimum layer of vegetative support material (topsoil or equivalent) and reseeded to establish a grass vegetative cover.

b) **Storm Water Management Systems:** Check the slope of drainage swales and correct any areas of ponding in the swales and/or remove obstructions. Remove silt accumulations from the bottom of retention basins to promote storm water infiltration, as necessary.

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COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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July 6, 2005

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

Town of Amherst
Department of Public Works
586 South Pleasant Street
Amherst, MA 01002
Attention: Guilford Mooring, Supt.

Re: Amherst-DSWM-Landfill
Old Amherst Landfill
Route 9 (South Side)
Initial Site Assessment
Permit Approval
05-008-001
BWPSW12
Transmittal #W052202

Dear Mr. Mooring:

On June 23, 2004, the Department of Environmental Protection (the Department) received the Initial Site Assessment (ISA) report for the Old Amherst Landfill (the "Old Landfill", hereinafter referred to in this document as "the landfill"), located south of Route 9 (Belchertown Road) in Amherst. The ISA Report was prepared by Tighe & Bond, Inc. (T&B), on behalf of the Town of Amherst (the Town). On October 26, 2004 the Department received additional ISA information from the Town, as requested.

Landfill History

The landfill was operated from the 1930s until its closure in 1986, when a 6 to 8 inch thick clay cap was installed over the entire landfill in accordance with engineering plans approved by the Department. The total capped area of the landfill occupies an area of at least 21 acres, although the exact acreage of the cap was not provided in the report. A junkyard, Amherst Recycling, had occupied approximately 4 acres adjacent to the southwestern portion of the landfill; this property was acquired by the town and included in the landfill capped area. The most recent municipal solid waste (MSW) fill area of the landfill is Phase I, the mounded area in the northwestern corner. The ISA contained

the results of a literature search of Town records for the landfill, including, Department of Public Works (DPW), Board of Health (BOH), and Water Department records. The ISA also contained an historical summary of the landfill operation and closure, based on records and on interviews with several current and former Town employees knowledgeable about the landfill.

Summary of Initial Site Assessment

Environmental assessment and monitoring activities at the landfill have to date consisted of the following:

- A total of approximately thirty groundwater monitoring wells have historically been installed surrounding the landfill since 1971 to monitor groundwater quality at various times and for various parameters, most of these wells have been destroyed and are no longer available for monitoring;
- The existing groundwater monitoring wells in the vicinity of the landfill apparently include the following: 5-89, 6-89, 3-80, 1-83, 2-83, 3-83,4-83, 2-85, 3-85, 1-94, 1-03, & 2-03. In addition, there are a number of upgradient monitoring wells which surround the "New Amherst Landfill" north of Rt. 9.
- Groundwater monitoring has indicated that groundwater flow is generally from east to west in the landfill vicinity;
- Most of the existing monitoring well network was installed to provide monitoring of groundwater conditions for the Town's Lawrence Swamp public water supply wells, located over one mile south of the landfill. Monitoring of wells 3-80, 2-85, 3-85, 3-83, 1-89, 2-89, 5-89, 6-89, 1-03, and 2-03 has been performed on an annual basis as required by the Department's Division of Water Supply (DWS).
- The recent monitoring performed for the DWS showed non-detectable (ND) levels of volatile organic compounds (VOCs) in the most southern monitoring wells 3-83, 2-85, 1-89, 2-89, and 3-89 (towards the Lawrence Swamp public water supply wells). Trace to low levels of several VOCs were found in some monitoring wells closer to the landfill (to the north), as follows: well 3-85 - 0.5 micrograms/liter (ug/l, or parts-per-billion) chloroform and 2.2 ug/l toluene; well 3-80 - 4.6 ug/l of cis-1,2 dichloroethylene (cis-1,2 DCE),0.6 ug/l of 1,2,4-trimethylbenzene, 0.9 ug/l vinyl chloride, and 0.5 ug/l xylenes; and well 6-89 - 2.2 ug/l toluene. All of these levels are below the Massachusetts Primary Drinking Water Standards & Guidelines (MCLs);
- Previous groundwater monitoring in 1985 had indicated the presence of a contaminant plume migrating from the landfill generally to the west. Former well OW-B (now destroyed), located approximately 1,000 feet west of the landfill (apparently in the center of the contaminant plume) had contained elevated levels of metals and indicator parameters (including lead at 130 ug/l, and nickel at 100 ug/l), and elevated levels of some VOCs, including toluene up to 460 ug/l;

- The Town's former Brickyard Wellfield, located approximately 2,000 feet west of the landfill, was closed in 1980 due to low levels (approximately 10 ug/l) of VOCs, attributed to the landfill;
- The Lawrence Swamp public supply wells have apparently shown no impact from the landfill, although no data was provided in the report;
- Surface water sampling was apparently performed in 1988 at locations west and northwest of the landfill, including Gull Pond and the "Skating Pond", although surface water data was not included in the report;
- In the 1980s, the Town installed a system to collect iron-stained surface water from an inlet to Gull Pond. The inlet discharge is directed to a settling tank, then to the Town's sanitary sewer system;
- As required by the Department, the Town completed private well surveys in 2003 and 2004 for the areas within a half-mile of the landfill by comparison of Assessor records to Water Department records. The surveys revealed that all residences and other buildings within a half-mile of the landfill are serviced by the Amherst public water system, except for the following: a private well at 126 Belchertown Road, located upgradient (east) of the landfill, which has been sampled historically as part of the Town's sampling program for the New Landfill (no landfill impact seen); and a private well located at 163 Wildfower Ave, used only for a non-contact geothermal heating system at that residence (not used as a drinking water source);
- Landfill gas (LFG) monitoring points were installed along the western perimeter of the landfill in the early 1990s, and LFG monitoring was performed at these points from 1995 through 1998. In 2003, LFG monitoring was performed at these LFG points, and also at LFG monitoring probes at other locations between the western perimeter of the landfill and nearby residences, from #163 Wildfower Lane north through #51 Tanglewood Road. LFG was non-detectable (ND) at almost all monitoring points and probes, with only the four most northern points containing detectable LFG. LFG points SG-21 and SG-22 at the northwestern corner of the landfill contained 36% Lower Explosive Level (%LEL) and 45% LEL respectively, at the property line, above the 25% LEL standard. LFG points located 50 feet and 75 feet west of the property line at these locations, between the landfill and the Hall commercial building located there, were ND for LFG.

DEPARTMENT DETERMINATIONS

Personnel of the Department have reviewed the ISA report and permit application for the landfill in accordance with MGL c. 111 s. 150A, MGL c. 30A, 310 CMR 19.000, the Department's publication

Landfill Technical Guidance Manual (the LAC), revised in May, 1997, and the Department's publication Standard References for Monitoring Wells (WSC-310-91). The Department has determined that the ISA report is acceptable in accordance with MGL c. 111, s. 150A and MGL c. 30A. The Department has determined that a Comprehensive Site Assessment (CSA) investigation and report shall be performed in accordance with the conditions outlined below.

1. An Interim CSA Report shall be submitted to the Department within 6 months of the date of this permit approval. The Interim CSA Report shall contain all of the information outlined below at Conditions 2 through 15 of this permit approval, including a Scope-of-Work for completion of the Final CSA Report (Final CSA SOW).

2. All existing site groundwater monitoring wells shall be identified and inspected to determine if they are valid sampling points. All existing site groundwater monitoring wells which are located and determined to be valid sampling points (including at a minimum, wells 3-80, 3-83, 2-85, 3-85, 1-89, 2-89, 3-89, 5-89, 6-89, 1-03, and 2-03) shall be sampled during one monitoring round and analyzed for the parameters outlined at 310 CMR 19.132(h)(1-3), including RCRA 8 metals (as total metals), VOCs by EPA Method 8260, and Pesticides by EPA Method 8081A.

3. The existing groundwater monitoring wells shall be sampled in accordance with the procedures outlined in the Department's publication Standard References for Monitoring Wells (WSC-310-91). Sampling can alternatively be performed in accordance with the USEPA publication Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated July 30, 1996.

4. All existing site groundwater monitoring wells shall be resurveyed to establish valid elevation datum. Groundwater elevations shall be measured at all existing site monitoring wells during the monitoring round, and a groundwater contour map shall be prepared from this data.

5. Surface water and sediment samples shall be obtained during one monitoring round from each of the following surface water sampling locations and shall be analyzed for the parameters outlined in 310 CMR 19.132(h)(1-3), including VOCs by EPA Method 8260 (with lower detection limits for surface water), and total RCRA 8 metals:

   - SW-1: The orange-stained water discharging from near the surface water collection system south of Gull Pond;
   - SW-2: The eastern shore of Gull Pond;
   - SW-3: Pomeroy Pond, adjacent to the landfill;
   - SW-4: Hop Brook (upstream), as a background location;

- SW-5: Hop Brook (downstream) just below the confluence of the Gull Pond;
- SW-6: The orange-stained wetland area on the "KC Trail";
- SW-7: An orange-stained wetland southeast of Owens Pond;
- SW-8: The wetland west of the former Brickyard Wellfield;
- SW-9: The stream discharging into Gull Pond; and
- SW-10. The "Skating Pond", if it still exists.

6. The private well at 163 Wildfower Ave, used for the non-contact geothermal heating system at that residence, shall be sampled for the parameters outlined in 310 CMR 19.132(h)(1-3), including VOCs by EPA Method 8260, and total RCRA 8 metals.

7. All VOC analyses by EPA Method 8260 shall be performed as outlined in 310 CMR 19.132(h)(1-3), specifically methyl ethyl ketone, methyl isobutyl ketone, and acetone shall be included, and unknown peaks having intensities greater than 5 times the background intensity shall be identified.

8. Quality Assurance/Quality Control Plan (QA/QC) protocols for all environmental monitoring should generally follow those outlined in the Department's LAC and Standard References manuals.

9. New landfill gas (LFG) monitoring wells (or permanent monitoring points) shall be installed at the following locations: two wells along the northern perimeter of the landfill; one well at the northeast corner of the landfill; two wells along the eastern perimeter of the landfill; and two wells along the southern perimeter of the landfill. The wells shall be constructed as outlined on page 4-15 of the LAC manual.

10. Monitoring of the new LFG wells and all existing LFG monitoring points shall be performed during one monitoring round. LFG monitoring shall be performed as outlined on p. 4-16 and 4-17 of the LAC manual for % Lower Explosive Limit (% LEL), % oxygen, and hydrogen sulfide. If LFG levels exceed 25% LEL at the property line, the Department shall be notified within 24 hours, as outlined in 310 CMR 19.132(4)(h), and the Town shall either monitor the residence(s) near the exceedance or monitor LFG monitoring wells closer to the residences for the same parameters. If LFG levels exceed 10% LEL within any building, the Department shall be notified within two hours, as outlined in 310 CMR 19.132(4)(g), and the Town shall take immediate action to protect public health and safety.

11. LFG monitoring shall also be performed during one monitoring round as outlined on p. 4-16 and 4-17 of the LAC manual for % Lower Explosive Limit (% LEL), % oxygen, hydrogen sulfide, and total VOCs, for ambient air at breathing zone height over the entire landfill cap area, at a spacing of 5 measurements per acre.

12. For the entire landfill cap area outside the Phase I MSW "Mound" area, shallow surface soil borings shall be performed through the vegetative support layer and impermeable soil layers of the cap, at a spacing of 1 boring per acre. The borings shall document the type and thickness of the vegetative support layer and impermeable soil layer. Prior to extending the soil boring into the impermeable layer, LFG monitoring shall be performed in each boring for the parameters outlined at Condition 11.

    Five representative soil samples of the vegetative support layer shall be analyzed for VOCs by EPA Method 8260, and total RCRA 8 metals. Five representative soil samples of the impermeable soil layer shall be analyzed for laboratory permeability by the triaxial cell method. All soil borings shall be closed by placing bentonite from the base of the borings to within 6 inches of the surface, with soil and sod replaced at the top of the boring above the bentonite. One surficial soil sample shall also be obtained from each of the following areas and analyzed for VOCs by EPA Method 8260 and total RCRA 8 metals: the former sand borrow pit area, just south of the landfill; and the area between the landfill perimeter and Pomeroy Pond.

13. An Interim CSA Report shall be submitted to the Department within 6 months of the date of this permit approval. The Interim CSA Report shall contain the following information:

    (A) Updated basemaps, depicting the locations of all: existing groundwater monitoring wells located and sampled; surface water and sediment sampling locations; street names; private wells, public wells; existing and new LFG monitoring points/wells; ambient-air LFG monitoring locations; landfill cap soil borings; surficial soil samples; and the specific extent of the landfill cap.
    (B) Construction details for new LFG monitoring points/wells;
    (C) Tabular summaries of all analytical and monitoring data performed as part of the CSA, including LFG monitoring and cap thickness data;
    (D) Laboratory data sheets for the CSA monitoring round;
    (E) Groundwater contour maps for the CSA monitoring round;
    (F) A Scope-of-Work for completion of the Final CSA (as outlined at Condition 12); and
    (G) A completed BWPSW23 application.

14. The Final CSA SOW shall be based on the results of the Interim CSA Report, and shall contain provisions for the following:
    (A) The installation and sampling of additional groundwater monitoring wells, sufficient to define the extent and nature of groundwater contamination from the landfill;
    (B) A second round of surface water samples;
    (C) A second round of LFG monitoring for LFG monitoring points/wells;
    (D) The submittal of all of the information as outlined in the LAC, p. C-26 through C-29; and
    (E) A proposal for post-closure maintenance and monitoring requirements for the landfill for the 30-year post-closure period.

15. If the Town wishes to utilize any portions of the landfill, or any land directly abutting the landfill, for any purposes other than as a closed and capped landfill (i.e. soccer fields, or other post-closure uses), then the Final CSA SOW shall contain a written SOW for completion of a Quantitative Risk Assessment, in accordance with the LAC, Chapter 8, sections IV & V for the specific post-closure use proposed, as well as a written SOW for compound-specific air monitoring for any use proposed on the landfill.

16. Appropriate Health & Safety (H&S) measures shall be utilized for all assessment work at the SCFA.

Pursuant to 310 CMR 19.037(5), any person aggrieved by the issuance of this approval, except as provided for under 310 CMR 19.037(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A and C. 30A not later than thirty [30] days following notice of this decision. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30 A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the permit by a court of competent jurisdiction, the permit decision shall remain effective or become effective at the conclusion of the 30 day period.

Any aggrieved person intending to appeal the decision to the superior court shall provide notice to the Department of said intention to commence such action. Said Notice of Intention shall include the Department File Number (05-008-002) and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of the Department and the Regional Director for the regional office which made the decision.

The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street-Third floor
Boston, MA 02108

&

Regional Director
Department of Environmental Protection
436 Dwight Street - 5th Floor
Springfield, MA 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

The Department reserves the right to require additional investigatory or remedial work, including alternative remedial measures, if continued monitoring results indicate such a need.

If you should have any questions or comments regarding this correspondence please contact Larry Hanson of this office, at #413-755-2287.

Sincerely,

Daniel Hall
Section Chief
Solid Waste Management

cc: Amherst Town Manager - Barry DelCastilho
Amherst Health Dept. - Epi Bodhi, Director
Amherst Water Dept. - Robert Pariseau
Amherst Leisure Services - Director
T&B, Inc. - Jeffrey Thelen
DEP/WERO/DWS - Katherine Skiba

A-308 MDEP

MRP 10/30/05

dd 10/20/05

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WESTERN REGIONAL OFFICE
436 Dwight Street • Springfield, Massachusetts 01103 • (413) 784-1100 • FAX (413) 784-1149

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Lieutenant Governor

STEPHEN R. PRITCHARD
Secretary

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Commissioner

OCT 2 7 2005

RECEIVED
OCT 2 8 2005
TIGHE & BOND

Town of Amherst
Department of Public Works
586 South Pleasant Street
Amherst, MA 01002
Attention: Guilford Mooring, Supt.

Re: Amherst-DSWM-Landfill
Old Amherst Landfill
Route 9 (South Side)
Comprehensive Site Assessment
SOW Approval - Modification
05-008-001
BWPSW12
Transmittal #W052202

Dear Mr. Mooring:

On July 6, 2005, the Department of Environmental Protection (the Department) issued its approval of the Initial Site Assessment (ISA) report and Comprehensive Site Assessment Scope-of-Work (CSA SOW) for the Old Amherst Landfill ("the landfill"), located south of Route 9 (Belchertown Road) in Amherst. The ISA Report/CSA SOW was prepared by Tighe & Bond, Inc. (T&B), on behalf of the Town of Amherst (the Town). On September 23, 2005 the Department received additional information from T&B concerning modifications to the CSA SOW, as discussed at a site meeting on September 15, 2005.

DEPARTMENT DETERMINATIONS

The Department has prepared this modification, under the authority of MGL Chapter 111 Section 150A and the regulations promulgated thereunder at 310 CMR 19.000. This document is a permit issued in accordance with the review procedures stipulated at 310 CMR 19.037 and 19.039 and is subject to all of the provisions contained therein.

The Department hereby modifies its July 6, 2005 ISA/CSA SOW permit approval as outlined below. All other conditions of the July 6,

2005 ISA/CSA SOW permit approval remain unchanged and in effect.

1. Existing site groundwater monitoring wells 3-68, 11-71, 3-80, 1-83, 2-83, 3-83, 2-85, 3-85, 5-89, 6-89, 1-94, 1-03, and 2-03 shall be sampled during one monitoring round and analyzed for the parameters outlined at 310 CMR 19.132(h)(1-3), including RCRA 8 metals (as total metals), VOCs by EPA Method 8260, and Pesticides by EPA Method 8081A.

2. Surface water and sediment samples shall be obtained during one monitoring round from each of the following surface water sampling locations and shall be analyzed for the parameters outlined in 310 CMR 19.132(h)(1-3), including VOCs by EPA Method 8260 (with lower detection limits for surface water), and total RCRA 8 metals:

   - SW-1: The orange-stained water discharging from near the surface water collection system south of Gull Pond;
   - SW-2: The eastern shore of Gull Pond;
   - SW-3: Pomeroy Pond, adjacent to the landfill;
   - SW-4: Hop Brook (upstream), as a background location;
   - SW-5: Hop Brook (downstream) just below the confluence of the Gull Pond;
   - SW-6: The orange-stained wetland area on the "KC Trail";
   - SW-7: A location near Owens Pond;
   - SW-8: The wetland west of the former Brickyard Wellfield; and
   - SW-9: The stream discharging into Gull Pond.

3. New landfill gas (LFG) monitoring wells (or permanent monitoring points) shall be installed at the following locations: two wells along the northern perimeter of the landfill (PGW-1 & PGW-2); one well at the northeast corner of the landfill (PGW-3); one well along the eastern perimeter of the landfill (PGW-4); one well along the southern perimeter of the landfill (PGW-5); one well along the western perimeter of the landfill (PGW-6); and one well at the northwest corner of the landfill (PGW-7). The wells shall be constructed as outlined on page 4-15 of the LAC manual.

The Department reserves the right to require additional investigatory or remedial work, including alternative remedial measures, if continued monitoring results indicate such a need.

The Department and its agents and employees shall have the right to enter upon the site at all reasonable times and without notice, to inspect the landfill and any equipment, structure or land located thereon, take samples, recover materials or discharges, have access to and photocopy records, to perform tests and to otherwise monitor compliance with this Permit and

all environmental laws and regulations. This right of entry and inspection shall be in addition to the Department's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and the Department.

Pursuant to 310 CMR 19.037(5), any person aggrieved by the issuance or denial of this permit decision, except as provided for under 310 CMR 19.037(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A and c. 30A not later than thirty [30] days following the receipt of the final permit. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30 A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the permit by a court of competent jurisdiction, the permit decision shall remain effective or become effective at the conclusion of the 30 day period.

Any aggrieved person intending to appeal the decision to the superior court shall provide notice to the Department of said intention to commence such action. Said Notice of Intention shall include the Department File Number (05-008-001) and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of the Department and the Regional Director for the regional office which made the decision. The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street-Third floor
Boston, 02108

Regional Director
Department of Environmental Protection
436 Dwight Street - Fifth Floor
Springfield, MA 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

This approval pertains only to the Solid Waste Management aspects of the proposal and does not negate the responsibilities of the owners or operators to comply with any other local, state or federal laws and regulations now or in the future.

If you should have any questions or comments regarding this correspondence please contact Larry Hanson of this office, at #413-755-2287.

Sincerely,

Daniel Hall
Section Chief
Solid Waste Management

cc: Amherst Health Dept. - Epi Bodhi, Director
T&B, Inc. - Jeffrey Thelen

A-0308 MDEP
JF 2/15/08

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
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Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

FEB 14 2008

Town of Amherst
Department of Public Works
586 South Pleasant Street
Amherst, MA 01002
Attention: Guilford Mooring, Supt.

Re: Amherst-DSWM-Landfill
Old Amherst Landfill
Route 9 (South Side)
Final Comprehensive Site Assessment
Deadline Extension
08-008-001
BWPSW23
Transmittal #W072576

Dear Mr. Mooring:

The Department of Environmental Protection (the Department) issued to the Town of Amherst (the Town) on October 23, 2007 its approval of the Interim Comprehensive Site Assessment (Interim CSA) report for the Old Amherst Landfill (the "Old Landfill", located south of Route 9 (Belchertown Road) in Amherst. The Interim CSA approval required the completion of additional environmental investigations at the landfill, with submittal of the Final CSA Report to the Department by April 23, 2008.

On December 11, 2007, the Department received a written request from you for an extension of the deadlines contained in the Interim CSA Approval, due to the need to allocate funding to complete the Final CSA Report at Annual Town Meeting. You propose to submit the updated private well survey by February 29, 2008, and to submit the Final CSA Report by November 1, 2008.

DEPARTMENT DETERMINATIONS

Personnel of the Department have reviewed the proposed request to extend the time deadlines for the Final CSA report and permit application for the landfill in accordance with MGL c. 111 s. 150A, MGL c. 30A, 310 CMR 19.000, the Department's publication

Landfill Technical Guidance Manual (the LAC), revised in May, 1997, and the Department's publication Standard References for Monitoring Wells (WSC-310-91). The Department has determined that the proposed time extension is acceptable in accordance with MGL c. 111, s. 150A and MGL c. 30A, subject to the conditions outlined below:

1. The updated private well survey required in Condition 1 of the Interim CSA approval shall be submitted to the Department by February 29, 2008.

2. The results of the surface water and sediment samples required in Conditions 6 & 8 of the Interim CSA approval shall be submitted to the Department by August 1, 2008, as a data report, including a map of locations and tabular summaries of the analytical results.

3. The Final CSA Report required in Condition 13 of the Interim CSA approval shall be submitted to the Department by November 1, 2008.

4. All other requirements of the Department's October 23, 2007 Interim CSA approval remain unchanged and in force.

The Department reserves the right to require additional investigatory or remedial work for the landfill, including the installation of additional monitoring wells or alternative remedial measures, if monitoring results indicate such a need. If you should have any questions or comments regarding this correspondence please contact Larry Hanson of this office, at #413-755-2287.

Sincerely,

Daniel Hall
Section Chief
Solid Waste Management

cc: Amherst Town Manager - Laurence Shaeffer
Amherst Health Dept. - Epi Bodhi, Director
T&B, Inc. - Jeffrey Thelen

A-0308 MDEP

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OCT 23 2007

Town of Amherst
Department of Public Works
586 South Pleasant Street
Amherst, MA 01002
Attention: Guilford Mooring, Supt.

Re: Amherst-DSWM-Landfill
Old Amherst Landfill
Route 9 (South Side)
Interim Comprehensive Site Assessment
Permit Approval
07-008-001
BWPSW23
Transmittal #W072576

Dear Mr. Mooring:

The Department of Environmental Protection (the Department) has completed review of the Interim Comprehensive Site Assessment (Interim CSA) report for the Old Amherst Landfill (the "Old Landfill", hereinafter referred to in this document as "the landfill"), located south of Route 9 (Belchertown Road) in Amherst. The Interim CSA Report was prepared by Tighe & Bond, Inc. (T&B), on behalf of the Town of Amherst (the Town), in accordance with the Department's approvals of the CSA Scope-of-Work.

Landfill History

The landfill was operated from the 1930s until its closure in 1986, when an impermeable soil cap and associated vegetative support layer was installed over the entire landfill in accordance with engineering plans approved by the Department. The total capped area of the landfill occupies an area of at least 21 acres, although the exact acreage of the cap was not provided in the report. A junkyard, Amherst Recycling, had occupied approximately 4 acres adjacent to the southwestern portion of the landfill; this property was acquired by the town and included in the landfill capped area. The most recent municipal solid waste (MSW) fill area of the landfill is Phase I, the mounded area in the

northwestern corner.

Summary of Comprehensive Site Assessment

Updated site maps were prepared, showing the location of all monitoring and sampling locations. CSA environmental assessment activities were performed both outside the landfill perimeter, and within the landfill perimeter. CSA assessment activities performed outside the landfill perimeter consisted of the following:

- Groundwater samples were obtained during one monitoring round from twelve existing groundwater monitoring wells, one existing bedrock geothermal well, and one newly-installed monitoring well;
- A groundwater contour and flow map was prepared from groundwater elevation data;
- Surface water samples were obtained during one monitoring round from nine surface water locations around the landfill;
- Groundwater and surface water samples were analyzed for the parameters outlined at 310 CMR 19.132(h)(1-3), including RCRA 8 metals (as total metals), volatile organic compounds (VOCs) by EPA Method 8260(including Tentatively Identified Compounds, or TICs), and Pesticides by EPA Method 8081A;
- Sediment samples were obtained during one monitoring round from the nine surface water locations around the landfill and were analyzed for the parameters outlined at 310 CMR 19.132(h)(1-3), including RCRA 8 metals and volatile organic compounds (VOCs) by EPA Method 8260 (including TICs);
- Seven landfill gas (LFG) monitoring wells were installed around the perimeter of the landfill;
- LFG monitoring for combustible gas (%Lower Explosive Limit, or %LEL, as methane), %oxygen, total VOCs, and hydrogen sulfide was performed at the seven LFG monitoring wells and at 30 LFG monitoring points along the western perimeter of the landfill; and
- One surficial soil sample from the sand pit area just south of the landfill (the sand pit area) was collected and analyzed for total RCRA 8 metals and VOCs by EPA Method 8260;

The results of the CSA monitoring and sampling performed outside the perimeter of the landfill were the following:

- The Town previously completed private well surveys in 2003 and 2004 for the areas within a half-mile of the landfill by comparison of Assessor records to Water Department records. The surveys revealed that all residences and other buildings within a half-mile of the landfill are serviced by the Amherst public water system, except for the following: a private well at 126 Belchertown Road, located upgradient (east) of the landfill, which has been sampled historically as part of the Town's sampling program for the New Landfill (no landfill

impact seen); and a private well located at 163 Wildflower Ave, used only for a non-contact geothermal heating system at that residence (not used as a drinking water source);

- The groundwater map indicated that groundwater flow is generally from east to west in the landfill vicinity. T&B states that groundwater flow from the landfill does not extend south of monitoring well 1-03, which is located approximately 1,000 feet south of the landfill (i.e., groundwater does not flow from the landfill towards the Lawrence Swamp public supply wells, which are located over one mile to the south);
- VOCs were generally non-detectable (ND) in all groundwater monitoring wells. Trace levels of several VOCs at levels well below the Department's Bureau of Waste Site Cleanup (BWSC) GW-1 groundwater standards were present in monitoring wells 3-68 and 3-80 located west of the landfill adjacent to the Hop Brook wetlands. Monitoring well 6-89, located in the sand pit area immediately south of the landfill, contained a trace of toluene, well below the GW-1 standard. All seven monitoring wells located from well 1-03 to the south, towards the Lawrence Swamp public supply wells, were ND for all VOCs, including TICs. The Lawrence Swamp public supply wells are regularly monitored according to the Department's Division of water Supply (DWS) requirements, and have shown no impact from the landfill;
- Pesticides were ND in all groundwater monitoring wells;
- Metals and indicator parameters were elevated in monitoring wells located downgradient (west) of the landfill, with exceedances of the Department's GW-1 and GW-3 groundwater standards in several monitoring wells, primarily for lead and chromium. Wells PGW-6, adjacent to the western perimeter of the landfill, and well 3-68, adjacent to the Hop Brook wetlands to the west, appeared to show the most impact for metals and indicator parameters. It should be noted that metals analyses were for total metals, which can produce artificially high analytical results due to possible turbidity of the samples;
- All surface water samples were ND for all VOCs, except for a trace of the VOC chlorobenzene (1.3 micrograms/liter, or ug/l) at sampling location SW-6 (a visibly impacted wetland area along the KC Trail), this level is well below the USEPA National Recommended Water Quality Criteria (WQC) surface water standard of 35,200 ug/l for chlorobenzene and the Department's Drinking Water standard of 100 ug/l for chlorobenzene;
- Surface water samples were at or below the WQC surface water standards for metals and indicator parameters at all sampling locations, except for iron at four locations (SW-1, the visibly-impacted inlet to Gull Pond; SW-2, a shoreline sample along Gull Pond; SW-6; and SW-7, a kettle-hole pond northwest of the landfill), and for lead at location SW-6, which slightly exceeded the WQC standard of 3.2 ug/l, but is less than the Drinking Water standard of 15 ug/l for lead. It should be noted that metals analyses for the surface water samples were performed as required for total metals, however the Department

now requires dissolved metals analyses for surface water samples, as the WQC standards are now based on dissolved metals analyses (total levels generally show higher levels than dissolved);

- The downstream surface water sample from Hop Brook showed slightly elevated levels of iron, manganese and barium versus the upstream sample. The level of iron in the downstream Hop Brook sample was at the WQC (Non-priority) chronic standard of 1.00 mg/l. All other RCRA 8 metals were ND in both upstream and downstream samples;
- Sediment samples were below the Department's Revised Stage I Freshwater Sediment Screening Criteria (SSC) guidelines, except for the following: sediment sample SED-6, at the SW-6 location, which contained arsenic at 53 milligrams/kilogram, above the SSC guideline of 33 mg/kg; sediment sample SED-7, which contained mercury at the SSC guideline of 0.18 mg/kg; and sediment sample SED-8, at the SW-8 location near groundwater monitoring well 3-68, which contained copper at 370 mg/kg, above the SSC guideline of 150 mg/kg;
- Sediment samples were ND for VOCs, except for traces of naturally-occurring TICs in several samples, and traces of single VOCs in samples SED-4 (the upstream sample on Hop Brook), SED-6, SED-7, and SED-8. There are no SSC guidelines for these VOCs, however the trace levels were well below the Department's S-1 soil standards for the compounds;
- Landfill gas (LFG) was ND at all seven perimeter LFG monitoring wells, although wells PGW-5 (southern perimeter, near sand pit area) and well PGW-7 (northwest corner) showed somewhat decreased oxygen levels in subsurface soils); and
- LFG was ND at all of the shallow LFG monitoring probes along the western perimeter, except for SG-21 and SG-22 at the northwest corner along the landfill perimeter, which contained over 100% LEL. Probes 50 feet and 75 feet outside of SG-21 and SG-22, however, were ND for LFG.

The following CSA assessment work was completed within the perimeter of the landfill, to assess the potential for post-closure uses of the landfill:

- The four existing LFG vents, within the northwest mound (Phase I) area of the landfill cap were monitored for LFG (%LEL, %oxygen, total VOCs, and hydrogen sulfide);
- Ambient air monitoring for LFG, %oxygen, total VOCs, and hydrogen sulfide) was performed at breathing zone height (5 ft) on a 100-foot grid across the entire landfill and sand pit area, at a total of 209 monitoring locations;
- A total of 43 test holes were dug through the landfill cap;
- At each test hole, the type and depth of cover soils, including the impermeable soil layer and the vegetative support (topsoil) layer, were characterized and recorded;
- At each test hole, the soil gas within the test hole above the

impermeable soil layer (i.e., the soil gas within the topsoil layer) was monitored for %LEL, %oxygen, total VOCs, and hydrogen sulfide;

- At six representative test holes, samples of the impermeable soil layer were collected and analyzed for hydraulic conductivity; and
- At seven representative test holes, samples of the topsoil layer were collected and analyzed for total RCRA 8 metals and VOCs by EPA Method 8260.

The results of the CSA monitoring and sampling performed within the perimeter of the landfill were the following:

- LFG was ND in the four LFG vents monitored;
- All 209 ambient air monitoring locations showed no measurable levels of %LEL or hydrogen sulfide; and showed atmospheric levels of oxygen. Ambient air monitoring at locations 1 through 31, located over the Phase 1 area, showed traces of total VOCs, from 0.1 parts-per-million (ppm) to 0.3 ppm, the remainder of the monitoring locations showed 0.0 ppm;
- The physical characterization of the test holes in the cap showed the following:
  - The entire cap thickness was equal to or greater than 24 inches in all test holes except #62 (near the northeast corner), which was 19" thick;
  - The impermeable layer of the cap was described generally as a silt and clay soil, with some test holes consisting of very fine sand and silt;
  - The impermeable layer was less than 6 inches in thickness in 9 of the 43 test holes, with the minimum thickness being 4 inches;
- LFG monitoring of soil gas within the test holes above the impermeable soil layer showed that all test holes showed no measurable levels of %LEL or hydrogen sulfide; and showed atmospheric levels of oxygen. LFG monitoring of test holes at stations 1, 14, 25 and 30, located over the Phase 1 area, showed traces of total VOCs, from 0.2 ppm to 0.5 ppm, the remainder of the test hole monitoring locations showed 0.0 ppm;
- The hydraulic conductivity of the six impermeable layer soil samples ranged from 3.4×10^{-4} centimeters/second (cm/sec) to 2.7×10^{-6} cm/sec, averaging 1.5×10^{-4} cm/sec; and
- The seven topsoil samples of the cap showed background levels of RCRA 8 metals, with no exceedances of the Department's S-1 or RCS-1 soil standards.

Recommendations by T&B

T&B recommends the following additional assessment work to complete the Final CSA for the landfill:

- The installation of one additional upgradient groundwater monitoring well and seven additional downgradient groundwater monitoring wells;
- Groundwater sampling of the eight additional monitoring wells and fourteen existing monitoring wells for one additional monitoring round;
- Surface water sampling of the eight previous surface water locations for one additional monitoring round;
- LFG monitoring of the seven LFG monitoring wells for one monitoring round; and
- Completion of a Final CSA report as specified in the LAC Manual, Pages c-26 through c-29.

DEPARTMENT DETERMINATIONS

Personnel of the Department have reviewed the Interim CSA report and permit application for the landfill in accordance with MGL c. 111 s. 150A, MGL c. 30A, 310 CMR 19.000, the Department's publication Landfill Technical Guidance Manual (the LAC), revised in May, 1997, and the Department's publication Standard References for Monitoring Wells (WSC-310-91). The Department has determined that the Interim CSA report is acceptable in accordance with MGL c. 111, s. 150A and MGL c. 30A. The Department has determined that the following assessment work shall be performed to complete the Final CSA Report:

1. The private well survey shall be updated for the previous survey area within a half-mile of the landfill, and the survey area shall also be extended to the Fort River, west and northwest of the landfill, and to Hop Brook, west and southwest of the landfill. The survey shall be performed as previously, by comparison of Assessor records to Water Department records, and shall be completed and submitted to the Department within 2 months of the date of this permit approval.

12/23/07

2. The proposed eight new groundwater monitoring well locations are acceptable. The following additional groundwater monitoring wells shall also be installed: a water-table well adjacent to the western perimeter of the landfill, between LFG monitoring wells PGW-6 and PGW-7; a water-table well adjacent to the western perimeter of the landfill, south of monitoring well PGW-6; a shallow, water table monitoring well adjacent to existing well 3-681; a bedrock monitoring well adjacent to existing well PGW-6; and a bedrock monitoring well adjacent to existing well 2-85.

3. All necessary precautions shall be taken during installation of all deep (confined and bedrock) monitoring wells to avoid potential cross-contamination at depth, including grouting of the annular space of all deep monitoring wells, above the bentonite seal, to a sufficient distance above the water table.

4. All new groundwater monitoring wells outlined above in Condition 2 shall be surveyed to establish valid elevation datum. Groundwater elevations shall be measured at all site monitoring wells during the monitoring round, and a groundwater contour map shall be prepared from this data.

5. Groundwater samples shall be obtained from the fourteen additional monitoring wells and fourteen existing monitoring wells for one additional monitoring round. Groundwater monitoring wells shall be sampled in accordance with the procedures outlined in the Department's publication Standard References for Monitoring Wells (WSC-310-91). Sampling can alternatively be performed in accordance with the USEPA publication Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated July 30, 1996.

6. Surface water samples shall be obtained for one additional monitoring round from the eight previous surface water locations and also from the following locations: one location in Owens Pond; one location in the pond west of Gull Pond; two locations on the stream outlet of Gull Pond; one additional location in the SW-6 wetland area; and one location in the wetland near proposed monitoring well 6-06/7-06.

7. Groundwater and surface water samples shall be analyzed for the parameters outlined at 310 CMR 19.132(h)(1-3), including RCRA 8 metals (as dissolved metals), and VOCs by EPA Method 8260 (including Tentatively Identified Compounds, or TICs), with lower VOC detection limits for surface water.

8. Sediment samples shall be obtained for one additional monitoring round from previous sampling locations SED-1, SED-4, SED-5, SED-6, SED-7, and SED-8, and from the new surface water location near proposed well 6-06/7-06, and shall be analyzed for the parameters outlined at 310 CMR 19.132(h)(1-3), including RCRA 8 metals and VOCs by EPA Method 8260. Two additional sediment samples shall be obtained for one additional monitoring round from the area of SED-6 and shall be analyzed for RCRA 8 metals.

9. All VOC analyses by EPA Method 8260 shall be performed as outlined in 310 CMR 19.132(h)(1-3), specifically methyl ethyl ketone, methyl isobutyl ketone, and acetone shall be included, and unknown peaks having intensities greater than 5

times the background intensity shall be identified.

10. Quality Assurance/Quality Control Plan (QA/QC) protocols for all environmental monitoring should generally follow those outlined in the Department's LAC and Standard References manuals.

11. Two new landfill gas (LFG) monitoring wells shall be installed to a depth of 10 feet at the following locations: one well between well PGW-6 and PGW-7; and one well south of well PGW-6. The wells shall be constructed as outlined on page 4-15 of the LAC manual.

12. Monitoring of the existing and new LFG wells and all existing LFG monitoring points shall be performed during one monitoring round. LFG monitoring shall be performed as outlined on p. 4-16 and 4-17 of the LAC manual for % Lower Explosive Limit (% LEL), % oxygen, and hydrogen sulfide. If LFG levels exceed 25% LEL at the property line, the Department shall be notified within 24 hours, as outlined in 310 CMR 19.132(4)(h), and the Town shall either monitor the residence(s) near the exceedance or monitor LFG monitoring wells closer to the residences for the same parameters. If LFG levels exceed 10% LEL within any building, the Department shall be notified within two hours, as outlined in 310 CMR 19.132(4)(g), and the Town shall take immediate action to protect public health and safety.

13. A Final CSA Report shall be submitted to the Department <u>within 6 months of the date of this permit approval.</u> The Final CSA Report shall contain the following information:

    (A) Updated basemaps, depicting the locations of all: groundwater monitoring wells; surface water and sediment sampling locations; street names; private wells, public wells; and existing and new LFG monitoring points/wells.
    (B) Construction details for monitoring wells;
    (C) Tabular summaries of all analytical and monitoring data performed as part of the CSA, including LFG monitoring data;
    (D) Laboratory data sheets for the second CSA monitoring round;
    (E) The groundwater contour map for the second CSA monitoring round;
    (F) The information outlined in the LAC, p. C-26 through C-29;
    (G) A baseline risk assessment, as outlined in the LAC, c. 8; and
    (H) A proposal for post-closure maintenance and monitoring requirements for the landfill for the 30-year post-closure period.

14. Appropriate Health & Safety (H&S) measures shall be utilized for all assessment work at the landfill.

Potential Post-Closure Uses

To date, the Department has received inquiries from various entities within the Town relative to the development of: soccer fields; a new Department of Public Works (DPW) facility; and a relocated transfer station. The CSA assessment work performed within the perimeter of the landfill indicated that post-closure use of significant portions of the landfill may be possible. The landfill cap is at least 24 inches thick in almost all areas, with generally a 6-inch thick impermeable layer, and the topsoils of the cap appear to represent clean, "background" soil conditions. Field monitoring of ambient air at breathing zone height above the surface of the landfill cap, and in the topsoil above the impermeable layer of the cap, did not show measurable levels of methane (%LEL) or hydrogen sulfide, and showed atmospheric levels of oxygen. T&B has stated that no post-closure use of the Phase 1 area would be sought by the Town, as that was the last (most recent) area of solid waste placement before the landfill closed.

If the Town wishes to seek post-closure use(s) for the landfill, a post-closure use permit application which complies with the requirements of 310 CMR 19.143 must be submitted to the Department for review and approval, prior to any such use, which must contain:

A. Specific plans, including written descriptions, figures showing exact locations of any proposed usage(s), and engineering plans and specifications, for any proposed uses;
B. A written SOW for completion of a Quantitative Risk Assessment, in accordance with the LAC, Chapter 8, sections IV & V for the specific post-closure use(s) proposed, as well as a written SOW for compound-specific air monitoring for any use proposed on the landfill.

Pursuant to 310 CMR 19.037(5), any person aggrieved by the issuance of this approval, except as provided for under 310 CMR 19.037(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A and C. 30A not later than thirty [30] days following notice of this decision. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30 A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the permit by a court of competent jurisdiction, the permit decision shall remain effective or become effective at the conclusion of the 30 day period.

Any aggrieved person intending to appeal the decision to the superior court shall provide notice to the Department of said intention to commence such action. Said Notice of Intention shall include the Department File Number (07-008-002) and shall identify

with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of the Department and the Regional Director for the regional office which made the decision.

The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street-Third floor
Boston, MA 02108

&

Regional Director
Department of Environmental Protection
436 Dwight Street - 5th Floor
Springfield, MA 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

The Department reserves the right to require additional investigatory or remedial work for the landfill, including the installation of additional monitoring wells or alternative remedial measures, if monitoring results indicate such a need. If you should have any questions or comments regarding this correspondence please contact Larry Hanson of this office, at #413-755-2287.

Sincerely,

Daniel Hall
Section Chief
Solid Waste Management

cc: Amherst Town Manager - Laurence Shaeffer
Amherst Health Dept. - Epi Bodhi, Director
Amherst Water Dept. - Robert Pariseau
Amherst Leisure Services - Director
Amherst Department of Conservation & Recreation - David Ziomek
T&B, Inc. - Jeffrey Thelen
DEP/WERO/DWS - Katherine Skiba
Elsie Fedderman

Jeffery J. Thelen

From: Hanson, Lawrence (DEP) [Lawrence.Hanson@state.ma.us]
Sent: Friday, October 10, 2008 4:45 PM
To: Jeffery J. Thelen
Subject: FW: Additional sediment sampling - Old Amherst Landfill

---

From: Hanson, Lawrence (DEP)
Sent: Friday, October 10, 2008 4:00 PM
To: 'Mooring, Guilford'; 'jjthelen@tighebond.com'
Cc: Hall, Daniel (DEP)
Subject: Additional sediment sampling - Old Amherst Landfill

Guilford -

As discussed, additional sediment sampling is required at several locations as part of the Old Amherst Landfill CSA, where there were some exceedances for some metals. The following additional sediment samples need to be obtained and analyzed for the parameters shown, and the results of the sampling submitted with the CSA report.

SED-1: 4 samples for arsenic, with 1 sample in the approximate SED-1 location, one west, one east and one south.

KC Trail Area, SED-6, SED-14, and SED-16: 10 samples for arsenic and cadmium, located along edges of visibly-impacted wetland and within wetland to delineate extent of exceedances.

SED-15: 3 samples for mercury, with 1 sample in the approximate SED-15 location, and 2 samples surrounding on edges of wetland area.

In addition, at the SED-15/SW-15 location, surface water at the 3 additional locations to be obtained and analyzed for cyanide and lead (lead as dissolved).

Also, could you please identify what the concrete structure (old dug well?) in the wetland at the KC Trail location is?

I can accompany T&B either before or during the additional sampling to confirm the sampling locations.

Thanks.

Jeffery J. Thelen

From: Hanson, Lawrence (DEP) [Lawrence.Hanson@state.ma.us]
Sent: Tuesday, October 28, 2008 10:48 AM
To: Jeffery J. Thelen
Subject: RE: A-0308 Old Amherst Landfill FCSA - Deadline Extension

no - I think the e-mail is ok.

From: Jeffery J. Thelen [mailto:JThelen@tighebond.com]
Sent: Tuesday, October 28, 2008 10:34 AM
To: Hanson, Lawrence (DEP)
Subject: RE: A-0308 Old Amherst Landfill FCSA - Deadline Extension

Good Morning Larry, do you need a letter for this?

Jeffery J. Thelen, P.G.

Senior Hydrogeologist

From: Jeffery J. Thelen
Sent: Wednesday, October 15, 2008 4:58 PM
To: 'Hanson, Lawrence (DEP)'
Cc: Guilford Mooring (MooringG@amherstma.gov); Peter M. Valinski
Subject: A-0308 Old Amherst Landfill FCSA - Deadline Extension

Larry, as we discussed this morning, the Town requests an extension for the submittal of the FCSA Report for the Old Amherst Landfill from November 1, 2008 to February 1, 2009.

Regarding today's sediment sampling, we anticipate receiving the sediment analytical data from the laboratory in the next 2-3 weeks and will forward the data to the MassDEP once Tighe & Bond summarizes the data and the Town reviews the data.

Thanks in advance for your consideration. Jeff.

Jeffery J. Thelen, P.G.

Senior Hydrogeologist

Tighe & Bond, Inc.

53 Southampton Road

Westfield, MA 01085

Tel. No. 413.572.3260

Fax No. 413.562.5317

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WESTERN REGIONAL OFFICE
436 Dwight Street • Springfield, Massachusetts 01103 • (413) 784-1100

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

Town of Amherst
Department of Public Works
586 South Pleasant Street
Amherst, MA 01002
Attention: Guilford Mooring, Supt.

DEC 2 9 2008

Re: Amherst-DSWM-Landfill
Old Amherst Landfill
Route 9 (South Side)
Comprehensive Site Assessment
Risk Assessment - Sediments
08-008-001

Dear Mr. Mooring:

On October 24, 2008, the Massachusetts Department of Environmental Protection (MassDEP) received the results of additional sediment and surface water sampling which had been required by MassDEP to be performed by the Town of Amherst (the Town) as part of the Comprehensive Site Assessment (CSA) investigation for the Old Amherst Landfill (the landfill), located south of Route 9 (Belchertown Road) in Amherst. MassDEP had required the completion of additional sediment and surface water samples at several locations downgradient of the landfill where previous CSA sampling had shown elevated levels of certain parameters, primarily metals.

DEPARTMENT DETERMINATIONS

The MassDEP has reviewed the additional sediment and surface water sampling data as part of the Final CSA report for the landfill in accordance with MGL c. 111 s. 150A, MGL c. 30A, 310 CMR 19.000, 310 CMR 40.0000, the Department's publication Landfill Technical Guidance Manual (the LAC), revised in May, 1997, and the Department's publication Standard References for Monitoring Wells (WSC-310-91). TheMassDEP has determined that the work outlined below shall be completed as part of the Final CSA:

1. A focused Quantitative Risk Characterization shall be performed for the following locations, to characterize

potential human health risks from elevated levels of certain metals in sediments as follows:

(A) The visibly-impacted ponded area located just south of Cross Brook Lane, which discharges to Gull Pond, at sediment locations SED-1 to SED-1C; risk characterization to evaluate elevated levels of arsenic in sediments at that location; and

(B) The visibly-impacted wetland area west/northwest of the KC Trail, at sediment locations SED-6 to SED-6L, SED-14 & SED-16; risk characterization to evaluate elevated levels of arsenic and cadmium in sediments at that location.

2. The focused Quantitative Risk Characterization shall be performed in accordance with: the LAC, Chapter 8, Section V; and the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000, as it applies to landfills pursuant to 310 CMR 40.0114.

3. An additional surface water sample shall be obtained at location SW-15A and analyzed for physiologically available cyanide (PAC).

4. The Final CSA Report shall be submitted to the MassDEP by February 1, 2009, which shall contain all of the information as previously required in Condition 13 of the MassDEP's October 23, 2007 Interim CSA approval, the results of the focused Risk Characterization as outlined in Conditions 1 &2 above, and the results of sampling outlined in Condition 3 above.

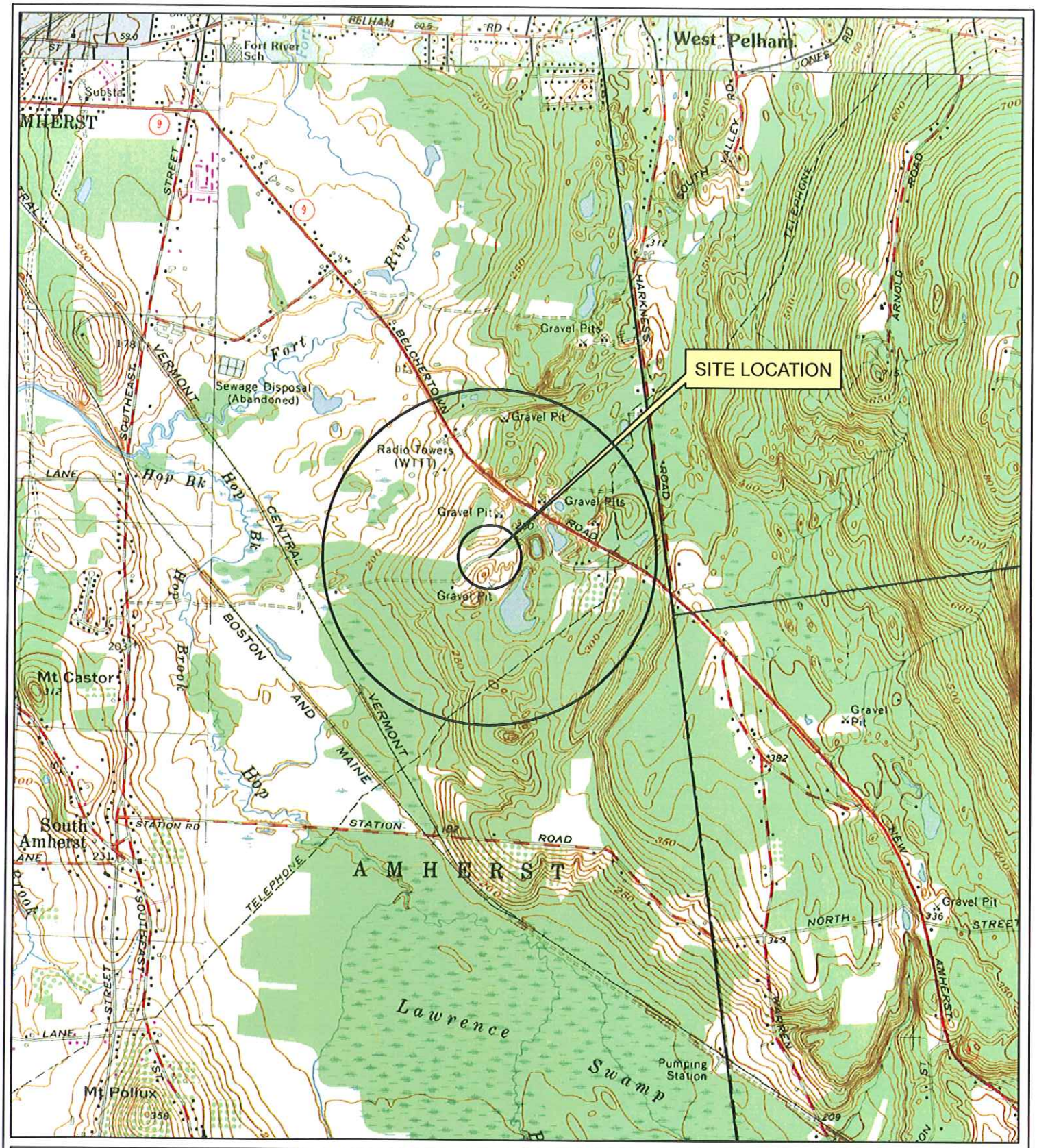
4. All other requirements of the MassDEP's October 23, 2007 Interim CSA approval remain unchanged and in force.

The Department reserves the right to require additional investigatory or remedial work for the landfill, including the completion of additional sampling or alternative remedial measures, if monitoring results indicate such a need. If you should have any questions or comments regarding this correspondence please contact Larry Hanson of this office, at #413-755-2287.

Sincerely,

Daniel Hall
Section Chief
Solid Waste Management

cc: Amherst Town Manager - Laurence Shaeffer
Amherst Health Dept. - Epi Bodhi, Director
T&B, Inc. - Jeffrey Thelen



1:25,000

0 2,000

Feet

Based on USGS Topographic Maps for Mt. Toby & Shutesbury, Mt. Holyoke & Belchertown, MA Quadrangles. Revised 1990 & 1979.
3-Meter & 10-Foot Contour Interval.

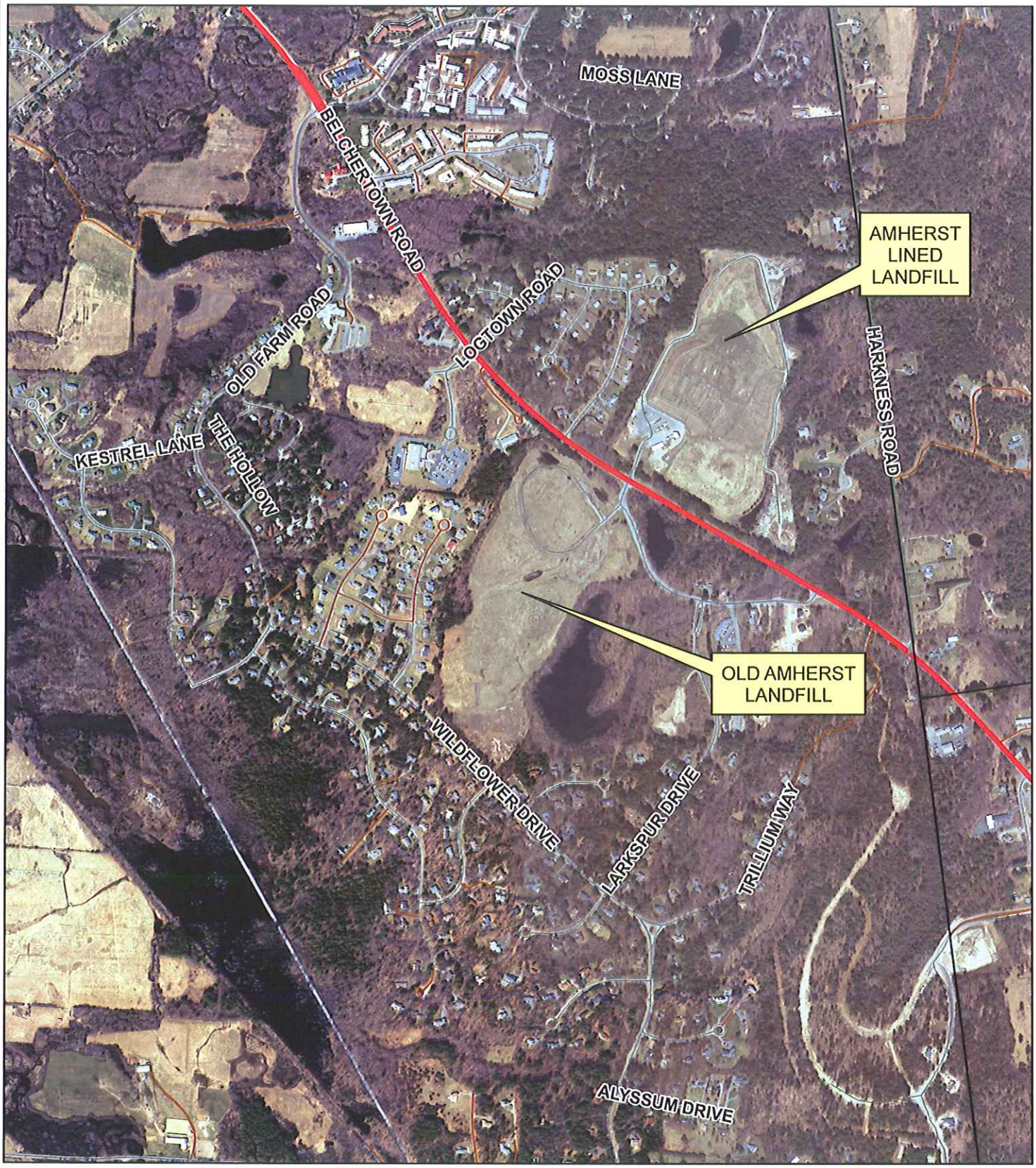
Circles indicate 500-foot and half-mile radii

FIGURE 1
SITE LOCUS MAP

Old Amherst Landfill
Amherst, Massachusetts

Tighe&Bond

January 2009



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0 1,000

Feet

Based on MassGIS Color Orthophotography (April 2005)
Orthophoto Sheet ID # 121898 & 121902

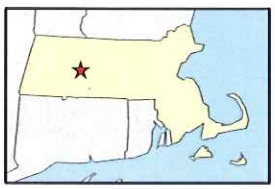
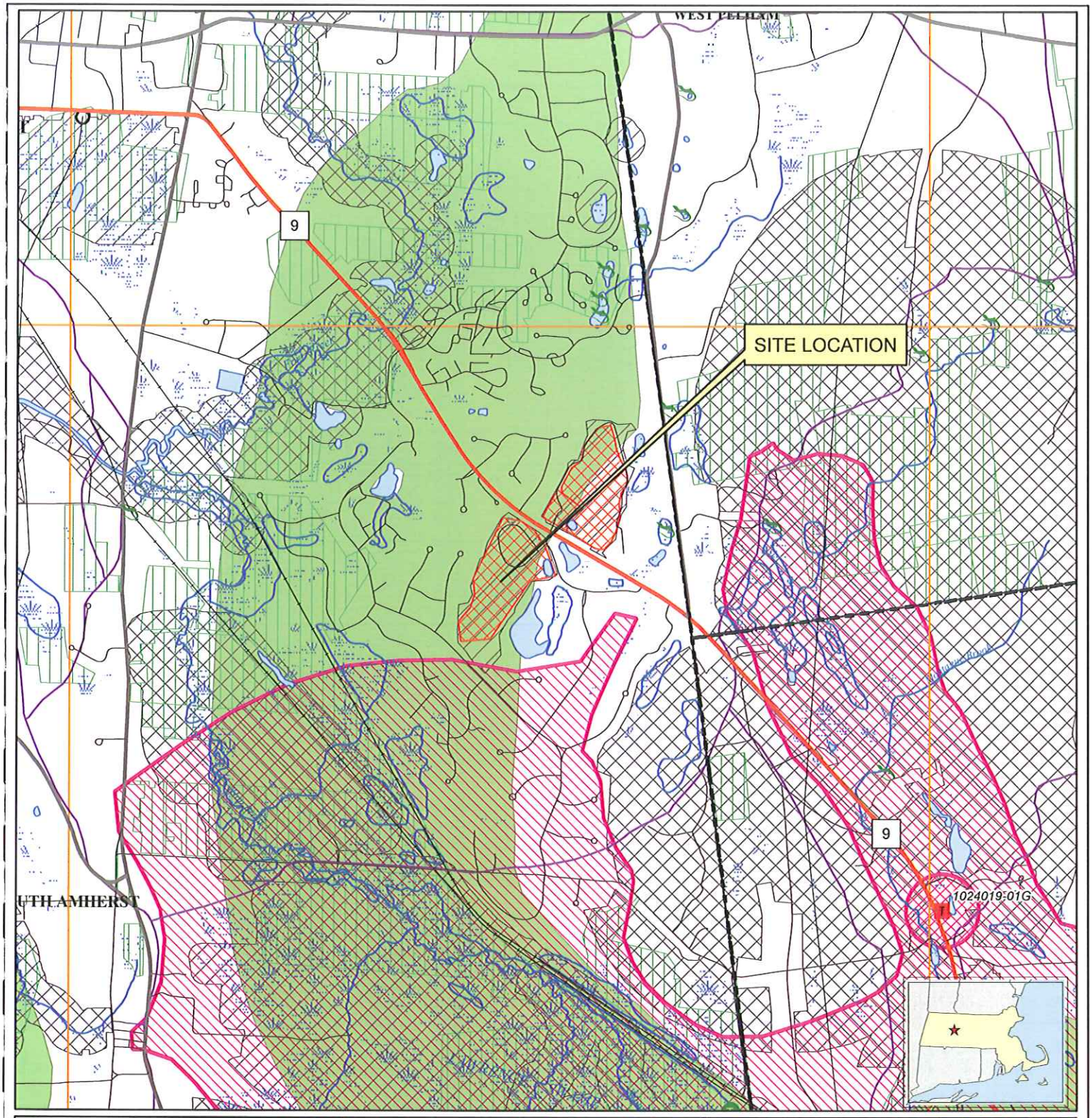


FIGURE 3
ORTHOPHOTOGRAPH

Old Amherst Landfill
Amherst, Massachusetts

Tighe&Bond

January 2009



NHESP Certified Vernal Pools
Community Public Water Supply - Surface Water
Community Public Water Supply - Groundwater
Non-Community Non-Transient Public Water Supply
Non-Community Transient Public Water Supply
Non-Potential Drinking Water Source Area - High Yield
Non-Potential Drinking Water Source Area - Medium Yield
Potentially Productive Medium Yield Aquifer
Potentially Productive High Yield Aquifer
EPA Designated Sole Source Aquifer
DEP Approved Wellhead Protection Area (Zone II)
DEP Interim Wellhead Protection Area (IWPA)
NHESP Priority Habitats for Rare Species
NHESP Estimated Habitats for Rare Wildlife
Public Surface Water Supply Protection Area (Zone A)
Protected and Recreational Open Space
Area of Critical Environmental Concern (ACEC)
Solid Waste Landfill

Public Surface Water Supply (PSWS)
Fresh Water Non-Forested Wetland
Salt Water Wetland
Waterbodies
Major Drainage Basin
Sub Drainage Basin
Limited Access Highway
Multi-Lane Highway, NOT Limited Access
Other Numbered Highway
Major Road - Collector
Minor Street or Road
Town Boundary
County Boundary
Quad Sheet Boundary
Track or Trail
Train
Powerline
Pipeline
Aquaduct

1:25,000
0 2,000
Feet

FIGURE 2
PRIORITY RESOURCE MAP

Old Amherst Landfill
Amherst, Massachusetts

Tighe&Bond

January 2009

Data source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. Data valid as of January 2009.